CLAIMS

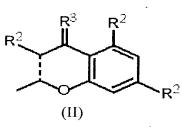
- Synthetic vegetal melanins obtainable by <u>in vitro</u> polymerization of at least one monomer unit (a), and optionally at least one compound (b), wherein.
 - (a) is a plant polyphenol; and
- 5 (b) is an eumelanin precursors; said synthetic vegetal melanin being characterized by a Red.Green Blue ratio comprised between 1 . 0.88 . 0.84 and 1 . 0.64 . 0.41.
 - 2 Synthetic vegetal melanins according to claim 1, wherein the plant polyphenol is a vegetal substance of formula (1).

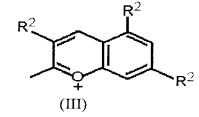
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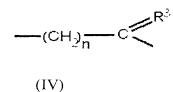
(I)

wherein:

R¹ represents hydrogen, hydroxy, or methoxy group; and X represents a residue of formulas (II), (III) or (IV)







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wherein.

n is 0,1 or 2;

- R² represent, each independently, hydrogen, hydroxy, methoxy, or an O-glycosilated group,
- R³ represents, one oxygen, two hydrogen atoms, or one hydrogen and one hydroxy group, and

the phantom line between C_2 - C_3 represents a double or a single bond, as well as salts, esters and solvates thereof.

25 3 Synthetic vegetal melanins according to claims 1 to 2, wherein the plant

polyphenol of formula (I) with X being a residue of formula (II) is a flavonoid selected in the group consisting in quercetin, fisetin, fustin, luteolin, OPC, catechin, epicatechin, GC, GCG, EGC, EGCG, myricetin, dihydroquercetin and mixture thereof.

- 5 4 Synthetic vegetal melanins according to claims 1 to 2, wherein the plant polyphenol of formula (I) with X being a residue of formula (III) is a flavonoid anthocyanins selected in the group consisting in cyanidin, delphinidin and mixture thereof.
- 5 Synthetic vegetal melanins according to claims 1 to 2, wherein the plant polyphenol of formula (I) with X being a residue of formula (IV) is an open ring dihydroxyphenol selected in the group consisting in hydroxytyrosol, protocathechuic acid, protocathechuic aldehyde, gallic acid, tannic acid and mixture thereof
 - 6 Synthetic vegetal melanins according to claims 1 to 2, wherein the eumelanin precursor is selected in the group consisting in L-dopa, DHI, DHICA, dopamine, pyrocatechol, pyrogallol and mixture thereof.

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- Method of producing synthetic vegetal melanins according to claims 1 to 6 comprising bubbling air or oxygen through an alkaline aqueous solution of the monomers at pH 10 or higher, during 12 to 48 hours, at a temperature ranging from 10 to 90°C.
- 8 Method of claim 7, further comprising catalytic amounts of pro-oxidant metals selected in the group consisting in Cu⁺⁺, Fe⁺⁺, Ni⁺⁺, Co⁺⁺ and mixture thereof
- 9 Method of claim 7 where the chemical oxidizing agent is selected in the group consisting in hydrogen peroxide, hydrogen iodide, ammonium persulfate, potassium permanganate, magnesium perchlorate and mixture thereof
- 10 Method of producing synthetic vegetal melanins according to claim 1 to 6 comprising bubbling air or oxygen through an buffered aqueous solution of the monomers at pH from 9.5 to 4.5, during 12 to 48 hours, at a temperature ranging from 20 to 45°C in presence of a suitable enzyme.
- 11. Method of claim 10, wherein the enzyme is selected in the group consisting in tyrosinases, polyphenoloxidases (catachol oxidases), phenolases,

- (phenoloxidases), peroxidases, laccases, lypoxygenase, and mixture thereof
- 12 Method according to claims 10 to 12 wherein the monomer units (a) or (b) are formed in situ from the pre-momomers, bearing a monophenolic moiety
- 13. Method of claim 12 where the pre-momomers are selected in the group consisting in dihydrokaempferol, armadendrin, p-hydroxybenzaldehyde, PHBA, tyrosol, p-coumaric acid, apigenin, kaempferol, pelargonin, genistein, tyrosine, tyramine, 5-hydroxy-indole and mixture thereof.
- 14. Cosmetic composition comprising as active ingredient at least one synthetic vegetal melanins according to claims 1 to 6.
- 10 15. Cosmetic composition according to claim 14, for facial make-up, hair dyes, tanning, anti-sun, toiletry, moisturizing and protecting skin.
 - 16. Pharmaceutical or nutritional composition having anti-inflammatory and immunomodulation activity which comprises as active ingredient at least a synthetic vegetal melanin according to claims 1 to 6.

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